AMBIO

Electronic Supplementary Material

This supplementary material has not been peer reviewed.

Title: Sustaining food self-sufficiency of a nation: the case of Sri Lankan rice production and related water and fertilizer demands

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Table S1. Best-fit statistics for rice yields disaggregated by zone (WZ/DZ) and growing season (Maha(major)/Yala(minor)). Following Grassini et al., (2013)'s decision tree, the best-fit line for the various models were evaluated using p-values and root mean square errors (rmse); because the linear-piecewise model parameters were significant for all four datasets, the linear-upper plateau and linear-lower plateau models were discarded. Models selected as best-fits are in italics.

Model	Best-fit line	Applicable years	R^2	p-value	rmse
Maha (major) WZ Yield[a]					
Linear	*y=23.197*yr-43016*	*All*	*0.68*	*7.26E-10*	*160.89*
Piecewise Linear	y=75.9*yr-147618	1979-1986	0.73	3.74E-11	159.63
	y=22.585*yr-41734	1987-2013			
Quadratic	$y=-0.193*yr^2+793.72*yr-811975$	All	0.67	1.03E-09	175.45
Exponential	y=0.0021*EXP(0.0071*yr)	All	0.68	8.87E-10	324.17
Maha (major) DZ Yield[b]					
Linear	*y=35.234*yr-66639*	*All*	*0.62*	*1.57E-08*	*280.02*
Piecewise Linear	y=24.346*yr-45170	1979-1995	0.64	6.17E-09	321.18
	y=73.529*yr-143291	1996-2013			
Quadratic	$y=0.5517*yr^2$-2167.2*yr+2000000	All	0.64	6.75E-09	131390.59
Exponential	y=0.00002*EXP(0.0095*yr)	All	0.62	1.17E-08	365.18
Yala (minor) WZ Yield[b]					
Linear	*y=27.159*yr-51246*	*All*	*0.69*	*9.35E-10*	*180.37*
Piecewise Linear	y=33.5*yr-64032	1979-1989	0.69	8.55E-10	225.72
	y=39.13*yr-75230	1990-2013			
Quadratic	$y=0.328*yr^2$-1281.7*yr+1000000	All	0.69	6.16E-10	254448.44
Exponential	y=0.00003*EXP(0.0092*yr)	All	0.69	7.19E-10	215.44
Yala (minor) DZ Yield[c]					
Linear	*y=37.211*yr-70547*	*All*	*0.75*	*1.73E-11*	*209.75*
Piecewise Linear	y=83.008*yr-161520	1979-1988	0.71	2.60E-10	280.51
	y=43.478*yr-82935	1989-2013			
Quadratic	$y=0.328*yr^2$-1281.7*yr+1000000	All	0.79	1.41E-12	461194.83
Exponential	*y=0.00003*EXP(0.0092*yr)*	*All*	*0.76*	*7.07E-12*	*205.40*

Notes
a: %RMSE difference between two models with smallest rmse is <5%; selected model with lowest # of parameters
b: % RMSE difference between two models with smallest rmse is >5%; selected model with the smallest rmse

c: %RMSE difference between two models with smallest rmse is <5%; both models have same # of parameters, and neither need transformation; they are both best fit models

Table S2. National water footprints and water use. 'Yield' subcategories represent scenarios in which only rice yield is improved but harvest frequency remains constant. 'Harvest' subcategories represent scenarios in which rice yield is improved and crop harvest frequency is maximized (i.e., 2 harvests per year). Percentages of total freshwater withdrawal and of renewable freshwater resources consider green, blue and grey water use.

		Current	50% YGC	75% YGC	90% YGC
Water demand ($km^3\ yr^{-1}$)					
Yield	*Green*	3.433	4.003	4.430	4.558
	Blue	1.705	1.706	2.513	4.407
	Grey	0.866	0.874	0.906	1.153
Harvest	*Green*	6.243	7.278	8.054	8.287
	Blue	3.099	3.102	4.569	8.014
	Grey	1.574	1.589	1.648	2.096
% of total freshwater withdrawal					
Yield		46.15	50.60	60.33	77.77
Harvest		83.91	91.99	109.69	141.40
% of renewable freshwater resources					
Yield		11.37	12.47	14.87	19.16
Harvest		20.67	22.67	27.03	34.84

Table S3. Comparison of historical and projected population numbers to the amount of people that could be fed under the three scenarios of yield, harvest, and efficiency. Values are displayed in Figure 3c. 'Efficiency' scenario utilizes water use efficiency at 50% YGC.

Number of people (10^6)	2000	2030	2050
Population	18.8	23.3	23.8
'Yield'	19.1	24.7	25.3
'Harvest'	34.7	44.9	46.0
'Efficiency'	22.7	22.7	23.2

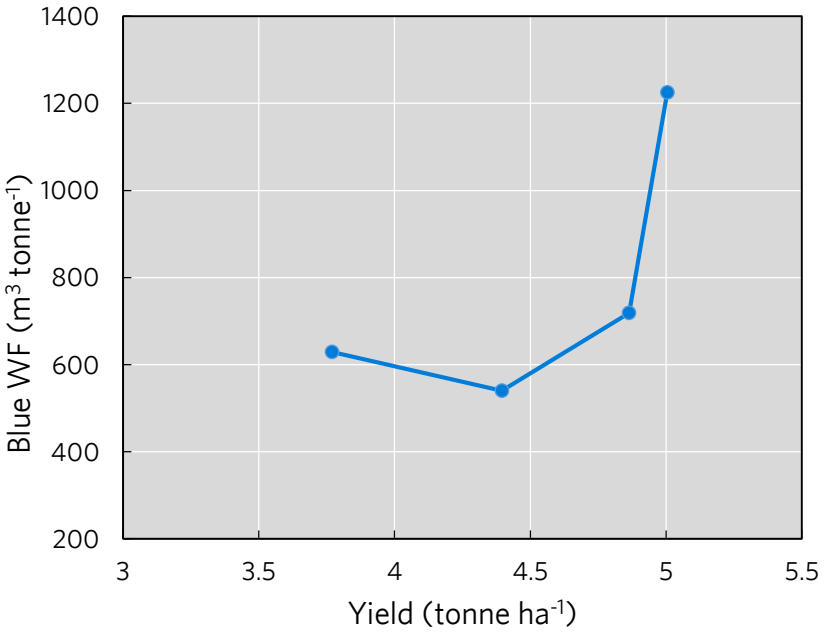

Figure S1. Blue water footprint associated with yield gap closures.

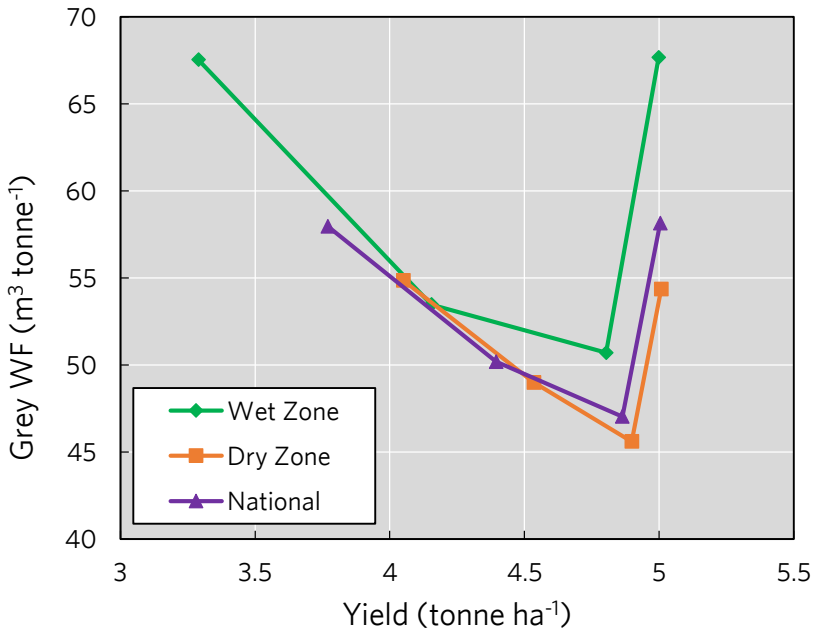

Figure S2. Grey water footprint associated with yield gap closures.